Patent Claims:

1. An intravenous oxygenator for enriching blood with oxygen, said oxygenator having a bundle of fibers allowing through flow of oxygen and carbon dioxide therealong, said fibers being each connected to a gas supply means through a first connection and to a gas evacuation means through a second connection so that oxygen and carbon dioxide are allowed to flow through the fibers from the first connections to the second connections, ***characterized in that*** the fiber bundle is twisted during operation by relative rotation of the first connections of the fibers relative to the second connections of the fibers about a longitudinal axis of the oxygenator.

2. The intravenous oxygenator as set forth in claim 1, ***characterized in that*** the connections are relatively rotated from 90° to 300°, preferably from 150° to 270°, more preferably about 240°, per 30 mm fiber length.

3. The intravenous oxygenator as set forth in claim 1 or 2, ***characterized in that*** at least a multiplicity, preferably at least a plurality, of the fibers are inclined, in their extension between the connections, at an angle of from 30° to 75°, preferably of from 42° to 71°, particularly of about 62°, to the longitudinal axis if the longitudinal axis and the fiber orientation are projected onto a projection cylinder that is coaxial with the longitudinal axis.

4. The intravenous oxygenator as set forth in claim 3, ***characterized in that*** the fibers are in the angular range mentioned over a major part of their length.

5. The intravenous oxygenator as set forth in any of the afore-mentioned claims, ***characterized in that*** the twisted bundle of fibers rests against an impermeable sheathing on the outside thereof.

6. The intravenous oxygenator as set forth in any of the afore-mentioned claims, ***characterized in that*** the twisted bundle of fibers has a diameter of from 15 to 30 mm, preferably from 15 to 25 mm.

7. The intravenous oxygenator as set forth in any of the afore-mentioned claims, ***characterized in that*** the connections of the twisted bundle of fibers are secured against untwisting themselves.

8. The intravenous oxygenator as set forth in any of the afore-mentioned claims, ***characterized by*** means for limiting further relative rotation of the connections of the twisted bundle of fibers.

9. The intravenous oxygenator as set forth in claim 7 or 8, ***characterized in that*** securement or limitation may be achieved by providing a frictional connection between a first fiber holder and a second fiber holder, with said fiber holders being connected to the connections.

10. The intravenous oxygenator as set forth in any of the afore-mentioned claims, ***characterized in that*** a neighboring bundle of fibers is twisted in the same direction as the bundle of fibers.

11. An intravenous oxygenator for insertion into a vein having a bundle of fibers allowing through flow of oxygen and carbon dioxide therealong, said fibers being each connected to a gas supply means through a first connection and to a gas evacuation means through a second connection so that oxygen and carbon dioxide are allowed to flow through the fibers from the first connections to the second connections, said connections being respectively connected to a first and to a second fiber holder and being displaceable along a longitudinal axis of the oxygenator, ***characterized in that*** the fiber holders are mounted so as to be rotatable relative to one another about the longitudinal axis of the oxygenator and to be displaceable preferably along said axis.

12. The intravenous oxygenator as set forth in claim 11, ***characterized by*** a first driver provided on the first fiber holder and a second driver provided on the second fiber holder, said drivers being directed toward each other and allowing rotation of the first fiber holder relative to the second fiber holder at least in one direction of rotation up to a rotation limit only without the second fiber holder being carried along when the two fiber holders are pressed into contact with each other.

13. The intravenous oxygenator as set forth in claim 12, ***characterized in that*** the rotation limit is a relative rotation of from 90° to 300°, preferably of

from 150° to 270°, particularly preferred of about 240°, for each 30 mm fiber length between the two fiber holders.

14. The intravenous oxygenator as set forth in any of the afore-mentioned claims, ***characterized by*** an abutment device provided on fiber holders for limiting a displacement of the connections relative to one another.

15. The intravenous oxygenator as set forth in any of the afore-mentioned claims, ***characterized in that*** fiber holders are disposed in the inner volume of the bundle of fibers.

16. The intravenous oxygenator as set forth in any of the afore-mentioned claims, ***characterized by*** a substantially elastic bond between two fiber holders.

17. The intravenous oxygenator as set forth in claim 15, ***characterized in that*** the elastic bond comprises a membrane and/or a linear spring.

18. The intravenous oxygenator as set forth in any of the afore-mentioned claims, ***characterized by*** a spiral guidance means for guiding fiber holders along the longitudinal axis of the oxygenator.

19. The intravenous oxygenator as set forth in any of the afore-mentioned claims, ***characterized by*** a blood pump for pumping blood through the bundle of fibers.

20. The intravenous oxygenator as set forth in any of the afore-mentioned claims, ***characterized in that,*** when the bundle of fibers is twisted, there is equilibrium of moments between the fibers and the force-transmitting bonds between the connections.

21. The intravenous oxygenator as set forth in claim 20, ***characterized in that*** it is assumed that the equilibrium of moments is achieved with a relative rotation of from 90° to 300°, preferably of from 150° to 270°, particularly preferred of about 240°, for each 30 mm fiber length between the two fiber holders.

22. The intravenous oxygenator as set forth in any of the afore-mentioned claims, ***characterized by*** a housing with an impermeable sheathing that is deformable in the radial direction in particular.

23. The intravenous oxygenator as set forth in claim 22, ***characterized in that*** the housing can expand to a diameter of 30 mm at the most, more specifically of 25 mm at the most.

24. The intravenous oxygenator as set forth in claim 22 or 23 ***characterized by*** a wire grate used as the carrier structure of the housing.

25. The intravenous oxygenator, more specifically as set forth in any of the afore-mentioned claims, ***characterized by*** a gear connected to a bundle of fibers.

26. The intravenous oxygenator as set forth in claim 25, ***characterized in that***, on a rotation device for twisting a plurality of fiber bundles connected in series, a gear is provided between the rotation device and a bundle of fibers in such a manner that the gear transmits a rotation of the rotation device onto the bundles of fibers at a ratio corresponding to the number of fiber bundles or to a ratio of the overall length of the bundles of fibers to a scale length.

27. An intravenous oxygenator with a pump and a catheter running beside the pump for conducting gas into and/or out of the oxygenator, ***characterized in that*** the catheter, and preferably the pump as well, are disposed off-center.

28. An intravenous oxygenator for enriching blood with oxygen, said oxygenator having a plurality of bundles of fibers allowing through flow of oxygen and carbon dioxide therealong, more specifically as set forth in any of the afore-mentioned claims, said fibers being each connected to a gas conduit system through a first connection and through a second connection so that oxygen and carbon dioxide are allowed to flow through the fibers from the first connections to the second connections, ***characterized by*** a mixing channel allowing through flow of gas therealong between different connections for generating a flow that is parallel to the flow through the fibers.

29. The intravenous oxygenator as set forth in claim 28, ***characterized in that*** flow resistances of the fibers and of the mixing channel during passage

through the oxygenator effect a volume flow ratio of at least 4:1 (flow in the mixing channel to flow in the fibers).